REMARKS

This is in response to the Office Action that was mailed on May 18, 2004. Applicants gratefully acknowledge the indication of allowable subject matter. The specification has been amended as requested by the Examiner. No new matter is introduced by this Amendment. Claims 1-15 are in the application.

Objection was raised to the specification. The specification has been amended as requested by the Examiner, thereby obviating the objection.

Claims 1, 2, and 4-15 were rejected under 35 U.S.C. §102(b) as being anticipated by US 5,061,560 (Tajima). This ground of rejection is respectfully traversed.

The present invention relates to thermal spray spherical particles that have a sufficient breaking strength to remain uncollapsed in flame or plasma during spraying. More specifically, the present invention provides spherical particles that consist essentially of a yttrium- or lanthanide-containing compound and that have a breaking strength of at least 10 MPa and an average particle diameter of 15 to 80 μm.

The present invention also provides thermal spray, high purity particles of rare earth-containing compounds which can be thermally sprayed to form a smooth, dense coating despite the high melting

point of the rare earth-containing compounds, and without generation of fines. This embodiment of the invention, more specifically, provides spherical particles that consist essentially of a yttrium- or lanthanide-containing compound and that have a bulk density of at least 1.0 g/cm^3, an aspect ratio of up to 2, and a cumulative volume of pores with a radius of up to 1 μm which is less than 0.5 cm^3/g.

Tajima discloses voidless rare earth oxide spherical grains containing about 0.01-1.0 parts by weight of a salt of an organic acid per 100 parts by weight of rare earth oxides. These grains have a mean grain diameter of from about 20-200 μm and are prepared by agglomerating a rare earth oxide powder, the particles of which have a mean diameter of about 1 μm or less.

Tajima fails to teach or suggest the presently claimed invention.

Firstly, Tajima teaches that the spherical grains of rare earth oxides are useful in the manufacture of sintered products of rare earth oxides, whereas the particles of the present invention are used not for sintered products but for thermal spraying. Tajima fails to disclose particles for thermal spraying.

Secondly, the rare earth oxide spherical grains of Tajima contain 0.01-1.0 weight-% organic acid. In contrast, the particles of the present invention do not contain such organic acids, since

any organic acid would be thermally decomposed during the firing of the particles at 1200-1800°C.

Furthermore, the inventive particles of yttrium- or lanthanide-containing compounds are prepared by granulating yttrium- or lanthanide-containing compound fines having a specific Fisher diameter into granules, and firing the granules at a temperature of 1500-1800°C, thereby providing particles having a satisfactory breaking strength. See the specification, page 7, lines 20-30. Firing at this specific high temperature is one of the requisite conditions for obtaining particles having the specified breaking strength.

In contrast, Tajima teaches conventional conditions for carrying out spray drying. Tajima discloses in Example 1, for instance, that spray drying is conducted with a hot air at a temperature of 72°C. Thus, the spherical grains obtained by the method of Tajima, at this low drying temperature, do not have a breaking strength of 10 MPa or more. Claim 1 herein expressly requires "a breaking strength of at least 10 MPa". In the Tajima technology, it is actually considered to be advantageous that the particle collapse when forming a disk plate, so as to provide a sintered body having a high density.

Although, as the Examiner has pointed out, in Tajima the grains may be formed into a disk plate and baked at a temperature of 1700°C, this is for sintering the formed disk plate, not for

preparing the grains. Further, there is no disclosure of the Fisher diameter of the starting rare earth oxide powder in Tajima. Clearly, the particles of the present invention are quite different from the grains of Tajima. Tajima fails to teach or suggest any means to obtain particles having the breaking strength required by the present invention.

Similarly, the spherical particles of the embodiment of this invention recited in claim 2 - which consist essentially of a yttrium- or lanthanide-containing compound and that have a bulk density of at least 1.0 g/cm^3, an aspect ratio of up to 2, and a cumulative volume of pores with a radius of up to 1 μm which is less than 0.5 cm^3/g - are obtained by granulating a slurry containing fines of a yttrium- or lanthanide-containing compound having a Fisher diameter of up to 0.6 μm and an average particle diameter of 0.01 to 5 μm, followed by drying and firing at a temperature of 1200-1800°C. See the specification, page 14, lines 4-19. Tajima, as noted above, discloses grains obtained by spray drying at a temperature of 72°C and that the gains obtained in this way are closely packed or voidless. Thus, Tajima fails to tech or suggest particles having the specific cumulative pore volume required by the present claims.

The particles of the present invention must have a specific cumulative pore volume of less than 0.5 cm^3/g. If the particle cumulative pore volume is 0.5 cm^3/g or greater, the particles

become more irregular on their surface. That is, smooth particle are not obtainable. In order that the particles maintain relatively good fluidity even when their particle diameters are reduced, the cumulative volume of pores with a radius of up to 1 μm should be less than 0.5 cm^3/g. Thus the particles of the present invention are quite different from the grains of Tajima.

Moreover, Tajima fails to teach or suggest a dispersion index of up to 0.6. The inventive particles have D10 of at least 10 μm, and a dispersion index of up to 0.6, which enables suppressed generation of fines, a sharp particle size distribution, and improved particle flow. This feature of the present invention has industrial significance. It precludes clogging of a nozzle through which the particles are fed.

Also, Tajima fails to teach or suggest a thermal sprayed component coated with particles of yttrium- or lanthanide-containing compounds according to the present invention.

In summary, Tajima fails to disclose the inventive particles for thermal spraying having the specified breaking strength and the particles having the specified cumulative pore volume. Accordingly, the present invention is not anticipated by the Tajima reference. Withdrawal of the rejection of record is respectfully solicited.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Richard Gallagher (Reg. No. 28,781) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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